# Section H. Anchoring

## Overview

**Introduction**

Anchoring must be performed correctly in order to be effective. This section discusses the techniques necessary to properly anchor a boat.

**In this section**

This section contains the following information:

# General Information

**H.1. Basic elements**

The basic elements to proper anchoring include:

- proper equipment availability
- knowledge to use that equipment
- ability to select good anchoring areas

**H.2. Terms and definitions**

The Anchoring System is all the gear used in conjunction with the anchor. The table below defines several of the terms used to describe the different parts of most modern types of anchors.

| Term | Definition |
|---|---|
| Anchor | A device designed to engage the bottom of a waterway and through its resistance to drag maintain a vessel within a given radius. |
| Anchor chocks | Fittings on the deck of a vessel used to stow an anchor when it is not in use. |
| Bow chocks | Fittings, usually on the rail of a vessel near its stem, having jaws that serve as fairleads for anchor rodes and other lines. |
| Ground tackle | A general term for the anchor, anchor rodes, fittings, etc., used for securing a vessel at anchor. |
| Hawspipe | A cylindrical or elliptical pipe or casting in a vessel's hull through which the anchor rode runs. |
| Horizontal load | The horizontal force placed on an anchoring device by the vessel to which it is connected. |
| Mooring bitt | A post or cleat through or on the deck of a vessel used to secure an anchor rode or other line to the vessel. |
| Rode | The line connecting an anchor with a vessel. |
| Scope | The ratio of the length of the anchor rode to the vertical distance from the bow chocks to the bottom (depth plus height of bow chocks above water). |
| Vertical load | The lifting force placed on the bow of the vessel by its anchor rode. |

## H.3. Reasons for anchoring

There are many reasons to anchor, the most important is for safety. Other reasons for anchoring are:

- engine failure,
- need to stay outside of a breaking inlet or bar,
- to weather a storm might require anchoring, or
- to hold your position while passing gear to a disabled vessel.

## H.4. Anchor types

There are different types of anchors with specific advantages of each type. The type of anchor and size (weight) of anchor a boat uses depends upon the size of the boat. It is advisable for each boat to carry at least two anchors.

- A working or service anchor should have the holding power to equal to approximately 6% of the boat's displacement.
- A storm anchor should be at least 150-200% as effective as the service anchor.

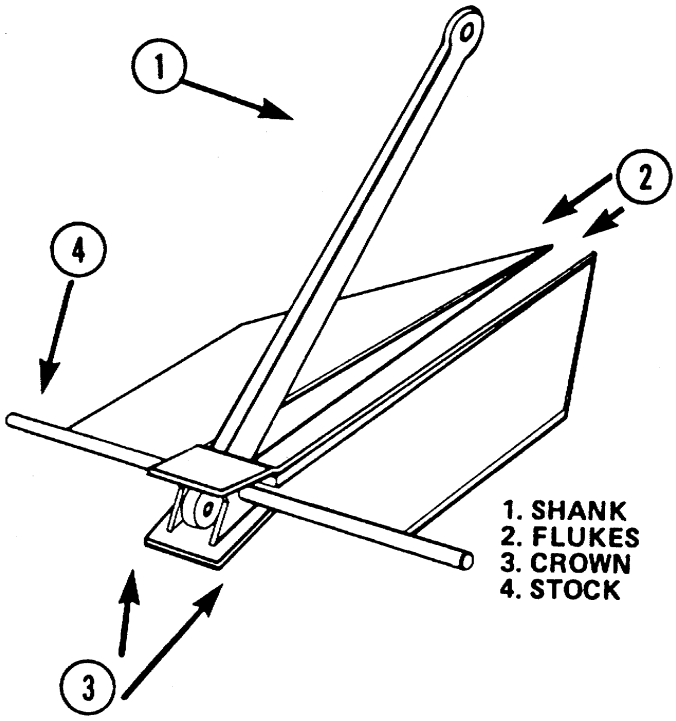
**Suggested Anchor Weights for Danforth Anchors**

| Maximum Boat Length | Working Anchor | Storm Anchor |
|---|---|---|
| 20 feet (approx. 7 meters) | 5 lbs. | 12 lbs. |
| 30 feet (approx. 10 meters) | 12 lbs. | 18 lbs. |
| 40 feet (approx. 12 meters) | 18 lbs. | 28 lbs. |

## H.5. Main parts of the Danforth anchor

Since most small boats use a Danforth type anchor, it is described below (See figure 10-28):

| Part | Description |
|---|---|
| Shank | Aids in setting and weighing the anchor. Attachment point for the anchor line. |
| Flukes | Dig in the bottom and bury the anchor, providing holding power. |
| Stock | Prevents the anchor from rolling or rotating. |
| Crown | Lifts the rear of the flukes, and forces the flukes into the bottom. |




**Main Parts of a Danforth Anchor**
**Figure 10-28**

# Ground Tackle

**H.6. General**

The complete anchor system consists of the anchor, the rode, and the various fittings connecting the rode to the anchor.

**H.7. Anchor rode**

The rode is the line from the boat to the anchor and is usually made up of a length of line plus a short length of chain. Large boats may use an all-chain rode. Each element of the system must be connected to its neighbor in a strong and dependable manner.

H.7.a. Type of line used

The most commonly used line for rode is nylon. The line may be either cable laid or braided, and be free of cuts and abrasions. Foot or fathom markers may be placed in the line to aid in paying out the proper amount of anchor rode.

H.7.b. Nylon and chain

Chain added with the rode has several advantages:

- lowers the angle of pull (the chain tends to lie on the bottom)
- helps to prevent chafing of the line on a coral or rocky bottom
- sand has less chance to penetrate strands of the fiber line higher up
- sand doesn't stick to the chain
- mud is easily washed off (without the chain, nylon gets very dirty in mud)

The chain used may vary from ¼-inch diameter for 20-footers up. It should be galvanized to protect against rust. Neoprene-coated chain has the benefit of not marring the boat, but such coating has a limited life in active use. Generally, anchors such as the Danforth and Northill, because of their greater holding power per anchor weight, need more anchor scope than a Navy or yachtsman anchor.

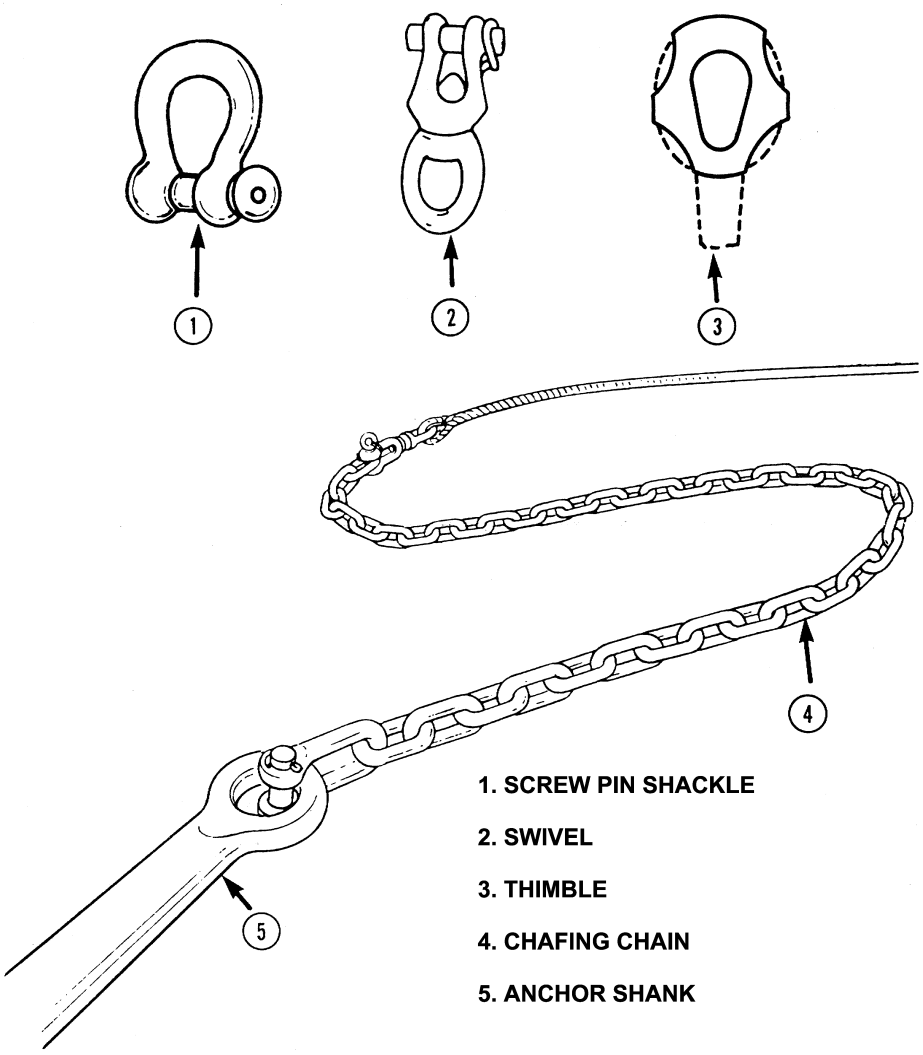
**NOTE**

SCOPE of the anchor rode should have a ratio range between 5:1 and 7:1. For heavy weather use 10:1.

# Fittings

**H.8. General**

There are various methods for securing the rode to the anchor ring. With fiber line, the preferred practice is to work and eye splice around a thimble and use a shackle to joint the thimble and ring.
(See figure 10-29)




**Anchor Fittings**
**Figure 10-29**

## H.9. Description

The following table describes the different fittings used to connect the rode to the anchor.

| Part | Description |
|---|---|
| Shackle | Bends the length of chafing chain to the shank of the anchor. |
| Swivel | Attaches the chafing chain to the detachable link. Allows the line to spin freely. |
| Thimble | Protects the anchor line from chafing at the connection point. Use synthetic line thimbles for lines 2¾" in circumference ($^{7}/_{8}$" diameter) and larger. |
| Chafing chain | Tends to lower the angle of pull of the anchor and assists in preventing chafing of the anchor line on the bottom. |
| Detachable link | Attaches the anchor and associated ground tackle to the anchor line (not mandatory). |
| Eye splice | Used around a thimble to connect it to a ring on the anchor by a shackle. |

# Anchoring Techniques

**H.10. General**

Before the need arises, the coxswain should brief the crew members on procedures for anchoring.

Anchoring involves good communication between the coxswain and the crew. With noise from the engine and exhaust, and sometimes the wind, it is usually difficult to hear voice communication. Have a pre-arranged set of hand signals that the crew understands. Keep the signals as simple as possible.

**NOTE**

PFDs must be worn during the anchoring operation.

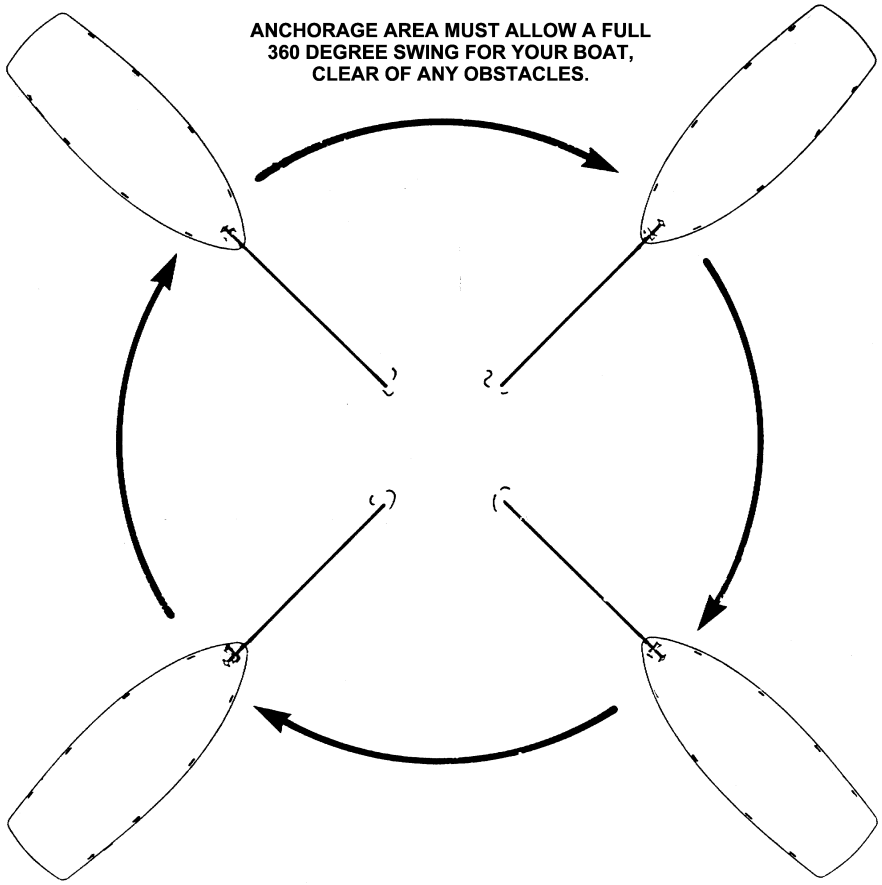
**H.11. Precautions for selecting anchorage area**

Sometimes it may be possible to choose a sheltered anchorage area in shallow water (40' or less).

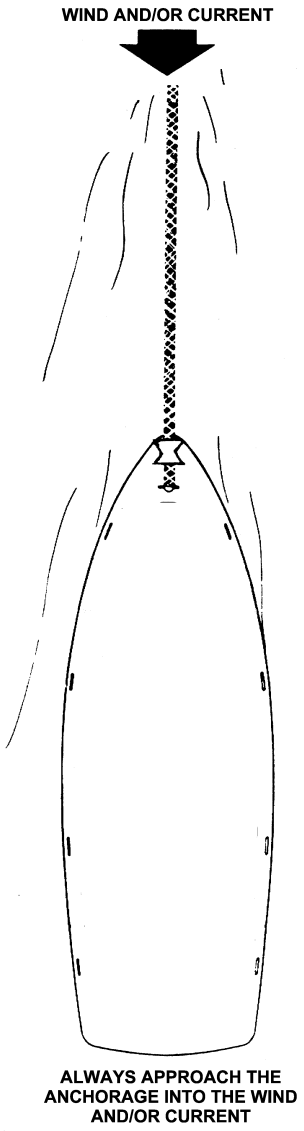
- Check charts to ensure that the anchorage area avoids any submerged cables or other obstructions.
- If other boats are in the same area, be careful not to anchor too close by the boats.
- Never drop within the swing area of another boat (See figure 10-30).
- Always approach the anchorage into the wind or current (See figure 10-31).

**NOTE**

Never anchor by the stern especially with small boats. Weather and seas may swamp the craft.




**Anchorage Swing Area**
**Figure 10-30**




**Approaching an Anchorage**
**Figure 10-31**

**H.12. Approaching the anchorage**

Having selected a suitable spot, run in *slowly*, preferably on some range ashore selected from marks identified on the chart, or referring to your position to visible buoys and landmarks to aid you in locating a chosen spot. Use of *two* ranges will give the most precise positioning. Later these aids will be helpful in determining whether the anchor is holding or dragging.

H.12.a. Bottom characteristics

Bottom characteristics are of prime importance. Characteristics of the bottom are normally shown on charts.

| Type | Description |
|---|---|
| Firm sand | Excellent holding quality an is consistent. |
| Clay | Excellent holding quality if quite dense, but sufficiently pliable to allow good anchor engagement. |
| Mud | Varies greatly from sticky, which holds well, to soft or silt that is of questionable holding power. |
| Loose sand | Fair, if the anchor engages deeply. |
| Rock and coral | Less desirable for holding an anchor unless the anchor becomes hooked in a crevice. |
| Grass | Often prevents the anchor from digging into the bottom, and so provides very questionable holding for most anchors. |

**H.13. Lowering the anchor**

As the anchor is lowered into the water, it is important to know how much rode is paid out when the anchor hits the bottom. It is advisable to take a round turn on the forward bitt or cleat to maintain control of the rode. If anchoring in a strong wind or current, the anchor rode may not be held with hands alone.

Unless you must work single-handed: station

| Steps | Procedure |
|---|---|
| 1 | Station one person on the forward deck. |
| 2 | Haul out enough line from the locker so as to run freely without kinking or fouling. If previously detached, the line must be shackled to the ring, and the stock set up (if of the stock type) and keyed. |

**NOTE**

Never stand in the coils of line on deck and don't attempt to "heave" the anchor by casting it as far as possible from the side of the boat. Lower hand over hand until it reaches the bottom.

Many an anchor has been lost for failure to attach the rode properly. Rodes too, have gone with the anchor when not secured at the bitter end.

Lightweight anchors are always ready for use and do not have to be set up, but always check to see that the shackle is properly fastened.

H.13.a. Length of rope (Scope)

The scope is a ratio of the length of rode paid out to the depth of the water. Pay out enough rode so the lower end of the rode forms an angle of 8° (or less) with the bottom. This helps the anchor dig-in and give good holding power.

**NOTE**

Generally, anchors with greater holding power per anchor weight (i.e., Danforth and Northill) need more anchor scope than Navy Yachtsman anchors.

H.13.b. Markers

Markers along the line, similar to those on a lead line, show the amount of rode that is out. It also helps to decide the scope necessary for good holding of the anchor.

**H.14. Setting the anchor**

An anchor must be "set" properly if it is to yield its full holding power. The best techniques for setting an anchor will vary from type to type; only general guidelines can be given here. Experiment to determine the best procedures for your boat, your anchors, and your cruising waters.

| Steps | Procedure |
|---|---|
| 1 | With the anchor on the bottom and the boat backing down slowly, pay out line as the boat takes it, preferably with a turn of line around the bitt or cleat. |
| 2 | When the predetermined scope has been paid out, snub the line quickly and the anchor will probably get a quick bite into the bottom. |

If the anchor becomes shod with mud or bottom grass adhering to the flukes, lift it, wash it off by dunking at the surface, and try again.

**H.15. After anchor is set**

After the anchor is set, you can pay our or take in rode to the proper length for the anchorage, and for the prevailing and expected weather conditions. Scope must be adequate for holding, but in a crowded anchorage you must also consider the other boats.

Attach chafing gear to the rode at the point where it passes through the chocks and over the side to prevent abrasion, wear, and tear on the rode and boat.

**H.16. Checking the anchor holding**

Make a positive check that the anchor is holding, and not dragging. There are several ways to do this.

- If the water is clear enough that you can see the bottom, you can detect any movement easily.
- If there is a jerk, or a vibration, the anchor is most likely not holding.

| | |
|---|---|
| | • Monitor bearings taken on at least two landmarks (if available) that are a minimum of 45° apart or use radar ranges and bearings. Small changes usually mean that the wind, tide, or current has caused the boat to swing around the anchor. If the compass heading is constant, but the bearings change, the anchor is dragging.<br>• If using a buoyed trip line from the crown of your anchor, apply reverse power to test the anchor's holding. The float on this line should continue to bob up and down in one spot unaffected by the pull on the anchor rode. |
| **H.17. Making fast** | After the anchor has gotten a good bite, with proper scope paid out, make the line fast and shut off the motor. The fundamental idea in making fast is to secure in such a manner that the line can neither slip nor jam. |
| H.17.a. Forward bitt | On boats with a forward bitt (sampson post), an excellent way to secure the anchor line is to make two full turns around the bitt, and then finish off with a half-hitch around each end of the pin through the bitt. The bitt takes the load and the pin secures the line, and the line is more easily taken off the bitt than with any other hitch. |
| H.17.b. Stout cleat | Where a stout cleat is used to make fast, take a full turn around the base, one turn over eah horn crossing diagonally over the center of the cleat, and finish with a half hitch around one horn. |
| **H.18. Night anchoring** | Put extra line (scope) out before securing for the night, just in case the wind increases. Also, check the weather report before retiring. Don't forget anchor lights where required. |
| **H.19. Anchor watch** | Whenever the situation is questionable (forecast weather, potentially hazardous location, extreme tide range, etc.), an anchor watch should be assigned to protect against disaster. See Chapter 1 - *Boat Crew Duties and Responsibilities* for a description of the duties of an anchor watch. |

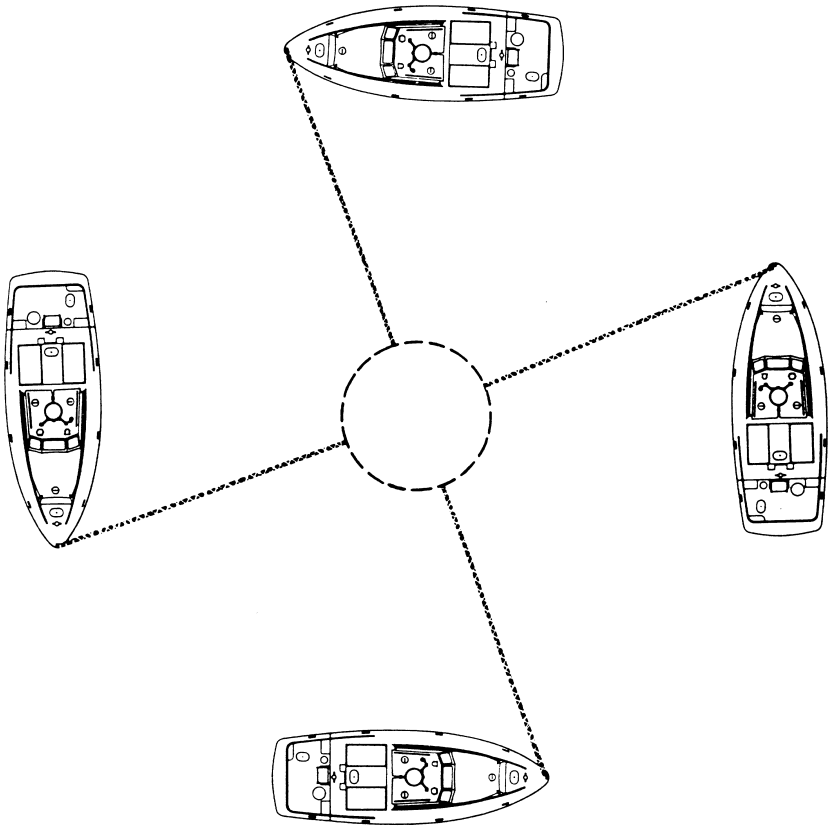
**H.20. Weighing anchor**

When you are ready to weigh anchor and get underway under power, go forward slowly and take in the anchor rode to prevent fouling the screws. Fake the line on the deck as it comes on board. When the boat approaches the spot directly over the anchor, and the rode is tending straight up and down, the anchor will usually free itself from the bottom.

**H.21. Clearing a fouled anchor**

If the anchor refuses to break free, snub the anchor line around the forward bitt or cleat and advance the boat a few feet. Sometimes even this will not free the anchor, and the operator should run in a wide circle, slowly, to change the angle of pull. Take extreme care to ensure the anchor line does not tangle in the screws during this operation.

Another way to break out an anchor is with a "trip line," if one was rigged during anchoring. A "trip line" is a line strong enough to stand the pull of a snagged anchor (a $^{3}/_{8}$-inch line is a typical size). Attach the "trip line" to the crown of the anchor (some anchors have a hole for this purpose). The "trip line" should be long enough to reach the surface in normal anchoring waters, with allowance for tidal changes. Pass the "trip line" through a float and end the line in a small eye-splice that can be caught with a boathook. If the anchor doesn't trip in the normal manner, pick up the trip line and haul the anchor up crown first.



**Freeing a Fouled Anchor**
**Figure 10-32**

**H.22. Clean the anchor**

Clean the anchor before bringing it on board. The anchor may have some "bottom" on it. Check the condition of the equipment and, before departure from the area, be sure the anchor is adequately secured to prevent shifting and damage to the boat.

## Anchor Stowage

**H.23. General**

Stowage of ground tackle depends upon the size of the boat. In smaller boats, it may be on deck, with the anchor secured in chocks to prevent shifting as waves cause the boat to roll. Some boats have the working anchor attached to a pulpit and the rode in a forward locker. The ground tackle should always be ready for use when the boat is underway.

**H.24. Maintenance**

After anchoring in salt water, rinse ground tackle off with fresh water before stowing it, if possible.

**Nylon** - Nylon rode dries quickly and can be stowed while damp.

**All-chain rode** - If using an all-chain rode, drying on deck before stowing will help to prevent rust.

**Natural fiber** - A natural fiber, like manila, must be thoroughly dried before stowage to prevent rot.

**H.25. Second anchor**

Some boats carry a second anchor to use as a storm anchor. It is stowed securely, but in a readily accessible place with a rode nearby. Inspect the second anchor from time to time to make sure all is in good condition.